
NAVFAC IGS-07220 (JUNE 2003)

Superseding IGS-07220 (05/02)
Preparing Activity: LANTNAVFACENGCOM Based on UFGS-07220N

ITALIAN GUIDE SPECIFICATIONS

Use for ITALIAN projects only

SECTION 07220

ROOF AND DECK INSULATION
06/03

NOTE: This guide specification is issued by the
Atlantic Division, Naval Facilities Engineering
Command for regional use in Italy.

NOTE: This guide specification covers the
requirements for insulation materials used below
built-up roofing and single ply roofing systems.

In new construction, provide at least a one in 24
slope in the structural deck and use non-tapered
insulation. When it is clearly impracticable to
provide at least the required slope or when
reroofing where there is insufficient slope,
consider the use of tapered insulation. Also, use
tapered insulation for the construction of saddles
and crickets to provide slope to drains.

Insulation for prefabricated metal buildings is not
included in this section. Insulating sheathing,
other materials which are not primarily thermal
insulating materials, and insulating concrete are
also not included. Such products are classified
according to their primary use, and should be
specified under the appropriate sections.

NOTE: On the drawings, show:

1. Extent and locations of work to be accomplished.
2. Dimensions when space limitations or
construction features govern thickness of insulation
materials.

3. Details at cants, edge strips, and nailers.

4. Location and spacing of wood nailers.

NOTE: Comments and suggestion on this specification are welcome and should be directed to the technical proponent of the specification. A listing of the technical proponents, including their organization designation and telephone number, is on the Internet.

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ITALIAN NATIONAL ASSOCIATION FOR UNIFICATION OF STANDARDS (UNI NORMS)

UNI EN ISO 845	(1997) Cellular Plastics and Rubbers - Determination of Apparent (Bulk) Density
UNI 4157	(1987) Bitumen for Spreading of Waterproofing
UNI 6350	(1968) Rigid Cellular Plastics - Determination of Compressive Characteristics
UNI 7745	(1977) Insulating Materials - Determination of Thermal Conductivity by Means of the Guarded Hot Plate Method
UNI 9051	(1987) Rigid Cellular Plastics - Polyurethane Panels with Flexible Facings, manufactured by Continuous Lamination - Types, Requirements and Test Methods

ITALIAN LAWS AND NORMS Decreto Ministeriate (D.M.)

D.M. n. 266-26.6	(1984) Classification of Resistance to Fire and Ratification of Materials for
------------------	---

Fire Prevention

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 4898 (1984, 1984/A1, 1984/A2 and 1984/A4)
Cellular Plastics - Specification for
Rigid Cellular Materials used in the
Thermal Insulation of Buildings

1.2 SINGLE SOURCE RESPONSIBILITY

The roof insulation shall be considered as part of the roof system. Roof insulation shall be approved by the manufacturer of the roofing membrane system. Comply with requirements of Section [0550] :Modified Bituminous Membrane Roofing".] [____]. The roofing manufacturer's warranty shall include the roof insulation and its installation.

1.3 SUBMITTALS

NOTE: Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item is required.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Recommended codes for Army projects are "RE" for Resident Engineer approval, "ED" for Engineering approval, and "AE" for Architect-Engineer approval. Codes following the "G" typically are not used for Navy projects.

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy projects.

Submit the following in accordance with section entitled "Submittal Procedures."

SD-02 Shop Drawings

NOTE: Specify shop drawing for wood nailers when nailers are required for securing insulation on roofs sloped one in 24/1/2 inch per foot or more. Specify shop drawings for tapered roof insulation system when multiple slopes are created with joining tapered insulation.

[Wood Nailers]

Tapered roof insulation system; G]

SD-03 Product Data

Fasteners; G

Insulation; G

[Asphalt]

[Asphalt primer]

[Include minimum thickness of insulation for steel decks and fastener pattern for insulation for steel decks.]

Submit data showing the thickness required for the type of insulation selected. Data for insulation system shall be based on the combined thermal properties of the concrete and insulation.

SD-06 Test Reports

Flame spread and smoke developed ratings

[SD-07 Certificates

NOTE: Specify these requirements when tapered insulation is required.

Installer qualifications]

SD-08 Manufacturer's Instructions

Mechanical fasteners and adhesive

Tapered insulation installation

1.3.1 Drawing Requirements

NOTE: Include requirement for backnailing felts when backnailing of felts is specified for built-up roofing. Include bracketed second and third

sentences when tapered insulation is specified.

[Show location and spacing of wood nailers that are required for securing insulation [and for backnailing of roofing felts]]. [Show a complete description of the procedures for the installation of each phase of the system indicating the type of materials, thicknesses, identity codes, sequence of laying tapered roof insulation, location of ridges and valleys, [crickets], special methods for cutting and fitting of insulation, and special precautions. The drawings shall be based on field measurements.]]

1.3.2 Flame Spread and Smoke Development Requirements

Submit in accordance with D.M. n. 266-26.6; materials non-flammable; Class 1 Norms.

1.3.3 Instruction Requirements

Data for mechanical fasteners and adhesive shall include all fasteners used to apply the insulation, as required by roof membrane manufacturer for resistance to wind uplift. Include information on requirements for perimeter roof attachment and field of roof attachment.

[Submit data showing the thickness required for the type of tapered insulation selected. Data for insulation system shall be based on the combined thermal properties of the concrete and insulation.]

Roof insulation installation, including field of roof and perimeter attachment requirements.

1.4 QUALITY ASSURANCE

1.4.1 [Insulation on [Steel] Decks

NOTE: Include this requirement when insulation is installed over plywood, wood planks other than nominal\0 mm\2 inch\thick, tongue-and-groove type of steel deck.

Comply with D.M. n. 266-26.6 for fire resistance classification; non-flammable; Class 1. Insulation listed as meeting the flame spread and smoke developed ratings will be accepted in lieu of copies of test reports. Compliance with flame spread and smoke developed ratings will not be required when insulation has been tested as part of a roof construction assembly of the type used for this project and the construction is listed as fire-classified. Insulation tested as part of a roof construction assembly shall bear appropriate testing agency labels attesting to the ratings specified herein.]

1.4.2 [Foam Board on [Steel] Decks

Separate [polyurethane] [or] [polystyrene] insulation from a [combustible] [steel] deck with a thermal barrier of fiberglass-faced gypsum board or roof insulation in accordance with the requirements of the roof membrane manufacturer.

Data for mechanical fasteners and adhesive shall include all fasteners used to apply the insulation, as required by roof membrane manufacturer for resistance to wind uplift. Include information on requirements for perimeter roof attachment and field of roof attachment.]

[1.4.3 Manufacturer's Certificate

Submit certificate from the insulation manufacturer attesting that the installer has the proper qualifications for installing tapered roof insulation systems.

]1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

Deliver materials to site in manufacturer's unopened and undamaged standard commercial containers bearing the following legible information:

- a. Name of manufacturer;
- b. Brand designation;
- c. Specification number, type, and class, as applicable, where materials are covered by a referenced specification; and
- [d. Asphalt's flashpoint (FP), equiviscous temperature (EVT), and finished blowing temperature (FBT).]

Deliver materials in sufficient quantity to allow continuity of the work.

1.5.2 Storage and Handling

Store and handle materials in a manner to protect from damage, exposure to open flame or other ignition sources, and from wetting, condensation or moisture absorption. Store in an enclosed building or trailer that provides a dry, adequately ventilated environment. [Store felt rolls on ends. For the 24 hours immediately before application of felts, store felts in an area maintained at a temperature no lower than 10 degrees C.] Replace damaged material with new material.

1.6 ENVIRONMENTAL CONDITIONS

Do not install roof insulation during inclement weather or when air temperature is below 4 degrees C or when there is ice, frost, or moisture visible on the roof deck.

[1.7 PROTECTION OF PROPERTY

NOTE: Where built-up roofing is applied over insulation, delete paragraphs entitled "Flame Heated Equipment" through "Drippage of Bitumen" and specify requirement enclosed in brackets in paragraph entitled "Protection of Property." Insert in space provided the number and title of section covering roofing where protection requirements are specified. Delete paragraphs entitled "Flame-Heated Equipment," "Protective Coverings," "Special Protection," and "Drippage of Bitumen" when roofing system or insulation does not require hot asphalt or torches for application.

[Provide protection as specified in Section [_____, "_____."]

1.7.1 Flame-Heated Equipment

Locate and use flame-heated equipment so as not to endanger the structure or other materials on the site or adjacent property. Do not place flame-heated equipment on the roof. Provide and maintain a fire extinguisher near each item of flame-heated equipment.

1.7.2 Protective Coverings

Install protective coverings at paving and building walls adjacent to hoist and kettles prior to starting the work. Lap protective coverings at least 150 mm, secure them against wind, and vent them to prevent collection of moisture on the covered surfaces. Keep protective coverings in place for the duration of the work with asphalt products.

1.7.3 Special Protection

Provide special protection approved by the insulation manufacturer, or avoid heavy traffic on completed work when ambient temperature is above 27 degrees C.

1.7.4 Drippage of Bitumen

Seal joints in and at edges of deck as necessary to prevent drippage of asphalt into building or down exterior walls.]

PART 2 PRODUCTS

NOTE: Insulation may be specified solely for use on steel decks as underlayment for roofing when insulation is not required for thermal properties. FM Approval for I-60 or I-90 classifications or resistance to wind uplift pressures of \2.87 or 4.31 kPa\]60 or 90 psf\, respectively. Refer to

MIL-HDBK-1002\2, for wind loads. Refer to FM Loss Prevention Data Sheet 1-7 for wind uplift prevention design. Specify no less than 4.31 Kpa \90 psf. Specify other fastener requirements if I-90 standards are determined to be inadequate.

2.1 INSULATION

2.1.1 Insulation Types

NOTE: Specify all types of insulation listed as Contractor options, except where method of construction and/or special requirements prohibit use. Thermal barrier of fiberglass-faced gypsum board or suitable roof insulation board must be installed directly on roof deck when polystyrene board will be applied over decks constructed of materials other than poured-gypsum; poured-concrete; nominal 50 mm thick, tongue-and-groove wood plank or precast roof deck panels; or planks approved as noncombustible roof deck construction.

Roof insulation should be specified by thermal resistance (R value) necessary to obtain required overall thermal transmittance (U value) needed to satisfy design criteria for particular type of facility. Thickness of insulation will vary with type of material furnished to provide specified "Thermal Resistivity" R value. When thickness of insulating material is governed by space limitations or construction features, R value and corresponding thickness should be coordinated with space available. Provide insulation of sufficient thickness to ensure that temperature of vapor retarder surface, when used, will be above dewpoint. R value for insulation should never be less than R value used in design of heating and/or air conditioning systems.

Roof insulation shall be one or an assembly of a maximum of three of the following materials and compatible with attachment methods for the specified insulation and roof membrane:

- a. Expanded Perlite Board: Minimum 19 mm thick when both top and bottom surfaces will be in contact with asphalt:

NOTE: Delete foil-faced board when fully adhered,

cold-applied single ply roofing is specified.

Blistering of roofing membranes has occurred over some polyurethane and composite (polyurethane) board insulation, possibly due to either release of gases from polyurethane, moisture entrapped in facing or plying felt, differential movement between roofing membrane and polyurethane resulting from thermal stresses on the materials, or inadequate brooming and mopping. When hot-applied built-up or modified bitumen sheet, or roofing is installed over insulation, it is recommended that thin layer of mineral fiber, or expanded perlite board insulation be placed over top surface of polyurethane board, embedded in solid asphalt mopping with joints of mineral fiber, or perlite board staggered in both directions with respect to polyurethane board below. The same precautionary procedure should be followed when polyisocyanurate foam boards are specified even though there may not be documentation of similar problems with these types.

b. [Foil faced both sides] [polyisocyanurate with [kraft] [or] [fiberglass] facer], UNI 9051. Facing containing asphalt are not permitted. Polyisocyanurate board shall meet the following requirements:

Density:	26 kg/cubic m (1.60 pcf)
Compressive strength (minimum	173 KPa (25 psi)
Thermal resistance of 25 mm max.	
at mean temperature of 24°C	0.99 Kcal/m.°C.h (5.60 Btu/F/sq.ft/h)
Water absorption by volume	
percent (max):	0.3 percent (ISO 4898))]

NOTE: Delete polystyrene composite board when insulation will be applied with hot asphalt

c. Composite Boards: [Perlite insulation board faced one side, fibrous felt or glass fiber mat membrane on other side.] [Polyisocyanurate-perlite] [; or [Polystyrene-wood fiberboard].

NOTE: Delete non-composite polystyrene board when insulation will be applied with hot asphalt or used under hot asphalt-applied roofing.

[d. Polystyrene Board:

Density:	26 kg/cubic m (1.60 pcf)
Compressive strength (minimum	173 kPa (25 psi)
Thermal resistance of 25 mm max.	
at mean temperature of 24°C:	0.99 Kcal/m.°C.h. (5.60 Btu/F/sq.ft/h))
Water absorption by volume	
percent (max):	0.3 percent (ISO 4898)

**NOTE: Specify high density type wood fiberboard
where the board is used as an overlayment and
fully-adhered single ply roofing is specified.**

e. Mineral Fiber Board: Facings containing asphalt are not permitted.
1219 by 1219 mm maximum board size].

Compressive strength at 4 percent	
consolidation:	3.6 kg/cm ² (UNI 6350)
Thermal conductivity at 20°C:	0.04 Kcal/m.°C.h (UNI 7745)
Density: High Density Type	176 Kg/cubic m. (UNI EN ISO 845)
Water absorption by percent volume	
- 2 hours:	1.5 percent (ISO 4898)
Reaction to fire:	Class O (D.M. n. 266-26.6)

2.1.2 Recovered Materials

Provide thermal insulation materials containing recycled materials to the extent practical. The required minimum recycled material content for the listed materials are:

Perlite Composition Board:	23 percent postconsumer paper
Polyisocyanurate/polyurethane:	9 percent recovered material
Phenolic Rigid Foam:	5 percent recovered material

2.1.3 Insulation Thickness

As necessary to provide a thermal resistance (R value) of 0.015 Kcal/m x °C x h or more [for average thickness of tapered system]. Thickness shall be based on the "R" value for aged insulation. [Insulation over steel decks shall satisfy both specified R value and minimum thickness for width of rib opening recommended in insulation manufacturer's published literature]. [Insulation Thickness over Concrete Slab: Insulation thickness for system over concrete slabs shall be as necessary to provide a maximum thermal conductance of not more than 0.24 Kcal/m².°C/h at the thinnest portion of the system. Comply with roofing manufacturers specific instructions for forming and sloping to drains.]

2.1.4 [Tapered Roof Insulation

NOTE: Where tapered roof insulation is used on a substrate sloped one in 48 and greater, insulation having a slope of one in 48 may be specified. Otherwise, specify tapered insulation having a slope of one in 24.

One layer of the tapered roof insulation assembly shall be factory tapered to a slope of not less than one in [24] [48]. Provide starter and filler blocks as required to provide the total thickness of insulation necessary to meet the specified slope and thermal conductance. Mitered joints shall be factory fabricated and shall consist of two diagonally cut boards or one board shaped to provide the required slopes. Identify each piece of tapered insulation board by color or other identity coding system, allowing the identification of different sizes of tapered insulation board required to complete the roof insulation system.]

2.1.5 [Cants and Tapered Edge Strips [Crickets]

NOTE: Generally cant strips are not required for single ply roofing systems. However, if cant strips are necessary, coordinate the location of cant strips with mechanical drawings to ensure that no projections, such as vent pipes and braces, will be constructed through cant strips or within 250 mm from cant strips. Specify wood cants, edge strips, and pressure preservative treatment in Section 06100, "Rough Carpentry."

Provide preformed cants and tapered edge strips [crickets] of the same material as the roof insulation; or, when roof insulation material is unavailable, provide pressure-preservative treated wood, wood fiberboard, or rigid perlite board cants and edge strips as recommended by the roofing manufacturer, unless otherwise indicated. Face of cant strips shall have incline of 45 degrees and vertical height of 100 mm. Taper edge strips [and] [crickets] at a rate of 85 to 125 mm per meter down to approximately 3 mm thick.]

Text

2.2 MANUFACTURERS

The following manufacturers comply with these specifications:

- a. Balzaretti Modigliani S.p.A.
Divisions Impermeabilizzazione
Via Pompeo Neri, 13

20146 - Milano
Tel.: 02-4226741

- b. Habitema S.r.l.
Viale Virgilio, 30/c
41010 - Modena
Tel.: 059-458900
- c. Eurofibre S.p.A.
Via Venier, 15a
30020 Maracon (Venezia)
Tel.: 041-4588900

2.3 [BITUMENS

NOTE: Where insulation is installed under roofing that does not require hot asphalt and vapor retarder is not required, delete asphalt, asphalt roof cement, asphalt-saturated felt, asphalt-coated glass felt, and asphalt primers. Always mechanically secure first layer of insulation to steel decks. For installation over steel and other decks not requiring vapor retarders or where asphalt is not used in installing insulation, specify only mechanical fastening of insulation. Coordinate requirements of this section with section specifying the roofing.

2.3.1 [Asphalt Primerr

Comply with requirements of UNI 4157]

2.3.2 [Asphalt

Standard for asphalt used in roofing.]

2.3.3 [Asphalt Roof Cement

Use asphalt roof cement type for horizontal surfaces, (up to 2 percent slope) and for vertical or sloped surfaces from 2 percent to 8 percent slope as recommended by the manufacturer of the roofing materials]).

2.4 [MOISTURE CONTROL

NOTE: Vapor retarder should be specified only where:

1. Outside, average January temperature is below 4 degrees C, and expected winter interior relative

humidity is 45 percent or greater;

2. Roofing system will be subject to continuing excessively high interior humidity; and

3. Results of detailed analysis indicate potential roofing problem resulting from water-vapor infiltration.

Delete contractor's option for single-layer vapor retarder for roofs over areas having excessively high interior humidity such as swimming pools and laundries. Generally, vapor retarder should be in direct contact with deck. However, compute dewpoint temperature and location and locate vapor retarder below dewpoint location. Avoid use of vapor retarder over steel decks unless vapor retarder is determined to be absolutely necessary. Do not specify wood fiberboard or any type of insulation sensitive to moisture for layer directly on steel deck. Specify installation of insulation over vapor retarder using hot asphalt to avoid puncturing vapor retarder. Combination of two or more layers of insulation should be of such thickness that dewpoint temperature will occur above vapor retarder located directly over first layer of insulation. Topside venting should always be provided by insulation vents and perimeter edge vents when vapor retarder is used. Specify venting requirements in roofing membrane specification section.

2.4.1 [Vapor Retarder

2.4.1.1 [Asphalt-Saturated Felt Base Sheet for Single Layer Application

Weighing not less than 17.5 kilograms per 10 square meters.]

2.4.1.2 [Asphalt-Coated Glass Felt

Asphalt-impregnated glass felt.]]

2.4.2 [Ventilating Felt for [Poured] [Precast] Concrete Decks

NOTE: Specify ventilating felt for new and existing concrete decks suspected of having retained moisture to aid in dissipation of any moisture retained in concrete. This felt shall not be considered to be a vapor retarder.

Heavy-duty asphalt-coated glass-fiber venting base sheet.]]

2.5 FASTENERS

Flush-driven through flat round or hexagonal steel plates. Steel plates shall be zinc-coated, flat round not less than 35 mm diameter or hexagonal not less than 0.4 mm. Fastener head shall recess fully into the plastic plate after it is driven. Plates shall be formed to prevent dishing. Do not use bell-or cup-shaped plates and fabricated of non-corrosive steel. Minimum withdrawal resistance of fasteners from deck shall be [18 kilograms (kgs) each] [54 kgs each in steel deck].

2.5.1 Fasteners for Steel Decks

Approved hardened penetrating fasteners or screws. Quantity and placement to withstand an uplift pressure of [2.87] [4.31] [_____] kPa. System, quantity and placement of fasteners shall be established by the manufacturer of the insulation board upon the pressure of the wind, slope of roof and related European Norms provided by UEA tc.

2.5.2 Fasteners for Poured Concrete Decks

Approved hardened fasteners or screws to penetrate deck at least 25 mm but not more than 38 mm. Quantity and placement to withstand an uplift pressure of [2.87] [4.31] [_____] kPa. System, quantity and placement of fasteners shall be established by the manufacturer of the insulation board upon the pressure of the wind, slope of roof and related European Norms provided by UEA tc.

2.6 WOOD NAILERS

NOTE: When roof slope exceeds one in 24, insulating materials beneath built-up roofing should be both mopped and held in place by treated wood nailers. Non-nailable decks should be provided with surface-applied nailing strips of same thickness as insulation. See built-up bituminous roofing specifications for requirements on nailing of roofing felts. For all insulated roof decks, treated wood nailers should be applied at eave edgings and sides of roofs and around curbs and elsewhere as necessary to provide nailing for gravel stops and flashings. Refer to UEA tc for method of attachment of nailers. A water-borne preservative treatment should be specified in Section 06100, "Rough Carpentry," for wood which will be in contact with bituminous materials.

Pressure-preservative-treated as specified in Section 06100, "Rough Carpentry."

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

3.1.1 Surface Inspection

Surfaces shall be clean, smooth, and dry. [Surfaces receiving vapor retarder shall be free of projections which might puncture the vapor retarder.] Check roof deck surfaces, including surfaces sloped to roof drains and outlets, for defects before starting work. The [Contractor shall] [Contracting Officer will] inspect and approve the surfaces immediately before starting installation. Prior to installing [vapor retarder] [ventilating felt] [insulation], perform the following:

- [a. Examine steel decks to ensure that panels are properly secured to structural members and to each other and that surfaces of top flanges are flat or slightly convex.]
- [b. Examine precast concrete decks to ensure that joints between precast units are properly grouted and leveled to provide suitable surfaces for installation of [ventilating felt] [vapor retarder] [and] insulation.]
- [c. In the presence of the Contracting Officer perform the following surface-dryness test on concrete substrates:
 - (1) Foaming: When poured on the deck, 0.50 liter of asphalt when heated in the range of 176 to 204 degrees C, shall not foam upon contact.
 - (2) Strippability: After asphalt used in the foaming test application has cooled to ambient temperatures, test coating for adherence. Should a portion of the sample be readily stripped clean from surface, do not consider surface to be dry and do not start application. Should rain occur during application, stop work and do not resume until surface has been tested by method above and found dry.]

3.1.2 Surface Preparation

Correct defects and inaccuracies in roof deck surface to eliminate poor drainage and hollow or low spots and perform the following:

- a. Install wood nailers the same thickness as insulation at eaves, edges, curbs, walls, and roof openings for securing cant strips, gravel stops, [gutters,] and flashing flanges. [On decks with slopes of one in 12 or more, install wood nailers perpendicular to slope for securing insulation [and for backnailing of roofing felts]. Space nailers in accordance with approved shop drawings.]
- [b. Fill or cover cracks or knot holes larger than 13 mm\\1/2 inch in diameter in wood decks as necessary to form unyielding surface.]
- [c. [Cover steel decks with a layer of insulation board of sufficient

thickness to span the width of a deck rib opening, and conforming to fire safety requirements. Secure with piercing or self-drilling, self-tapping fasteners. Insulation joints parallel to ribs of deck shall occur on solid bearing surfaces only, not over open ribs.]

[Solidly apply asphalt primer to [poured] [precast] concrete decks at the rate of 4 liters per 10 square meters \\ one gallon per 100 square feet\ of roof surface [, stopping approximately 100 mm \\4 inches from joints between the precast concrete units]. Allow primer to dry thoroughly. [Place felt strips, 100 mm or more in width, over joints, 50 mm on each side, between precast concrete units in a heavy coating of cold-applied asphalt roof cement.]]

3.2 [INSTALLATION OF VAPOR RETARDER

Install vapor retarder in direct contact with [roof deck surface] [ventilating felt] [insulation]. Vapor retarder shall consist of [either] two plies of asphalt-saturated felt weighing 1.5 kg per square meter, two plies of asphalt-coated glass felt [, or one layer of asphalt-saturated felt base sheet]. Lay vapor retarder at right angles to direction of slope. Install first ply of felt [or base sheet] as specified herein for the specific deck. Apply second ply of 2-ply vapor retarder system using asphalt at rate of 10 to 18 kg per 10 square meters, applied within plus or minus 15 degrees C of EVT. Do not heat asphalt above asphalt's FBT or 275 degrees C, whichever is less. Use thermometers to check temperatures during heating and application. Vapor retarder shall be free of wrinkles or buckles. Press out air bubbles to obtain complete adhesion between surfaces. At walls, edges, and other vertical projections, extend vapor retarder 150 mm to form a lap which shall later be wrapped around edge of insulation on top of vapor retarder.]

3.2.1 [Vapor Retarder on Poured Concrete Decks

Solidly mop primed substrate with asphalt at rate of 10 to 18 kg per 10 square meters before installing vapor retarder. Lay first ply of 2 ply system with each sheet lapping 480 mm over the preceding sheet. Lap ends not less than 100 mm. Stagger laps a minimum of 300 mm. [For a vapor retarder consisting of one layer of asphalt base sheet, provide side and end laps not less than 100 mm. Stagger laps a minimum of 300 mm. Cement base sheets together with a solid mopping of asphalt.]]

3.2.2 [Vapor Retarder on Precast Concrete Decks

Solidly mop primed substrate with asphalt at rate of 10 to 18 kg per square meters before installing vapor retarder. Lay first ply of 2 ply system with each sheet lapping 480 mm over preceding sheet. Lap ends not less than 100 mm. Stagger laps a minimum of 300 mm. [For vapor retarder consisting of one layer of asphalt base sheet, provide side and end laps not less than 100 mm and stagger laps a minimum of 300 mm. Cement base sheets together with a solid mopping of asphalt.]]

**NOTE: Avoid use of vapor retarder over steel decks
unless vapor retarder is determined to be absolutely
necessary.**

3.2.3 [Vapor Retarder on Steel Decks

Solidly mop the mechanically secured insulation surface with asphalt before installing vapor retarder. For a 2 ply vapor retarder, install each sheet lapping 480 mm over the preceding sheet. Lap ends not less than 100 mm. Stagger the laps a minimum of 300 mm. Cement felts together with solid mopping of asphalt. Apply asphalt moppings at rate of 10 to 18 kg per 10 square meters. [For a vapor retarder consisting of one layer of asphalt base sheet, lap each sheet 100 mm over preceding sheet. Lap ends not less than 100 mm, and stagger laps a minimum of 300 mm. Cement base sheets together with solid mopping of asphalt.]]

3.3 [INSTALLATION OF VENTILATING FELT

**NOTE: Specify ventilating felt for new and existing
concrete decks suspected of having retained moisture
to aid in dissipation of any moisture retained in
concrete. This felt shall not be considered to be a
vapor retarder.**

**Include bracketed phrase only when insulation is to
be applied with hot asphalt.**

Apply ventilating felt in accordance with manufacturer's printed instructions[, spot-mopped with asphalt to concrete deck]. Extend over roof cants, up vertical surfaces and terminate under cap flashing; at roof edges terminate under outside edge of perimeter edge nailers or under gravel stop fascia.]

3.4 INSULATION INSTALLATION

Apply insulation in two layers with staggered joints when total required thickness of insulation exceeds 13 mm. Lay insulation so that continuous longitudinal joints are perpendicular to direction of [felts for the built-up] roofing, as specified in Section [_____, "_____"], and end joints of each course are staggered with those of adjoining courses. When using multiple layers of insulation, joints of each succeeding layer shall be parallel and offset in both directions with respect to layer below. Keep insulation 13 mm clear of vertical surfaces penetrating and projecting from roof surface.

3.4.1 [Installation Using Asphalt

Firmly embed each layer in solid asphalt mopping; mop only sufficient area to provide complete embedment of one board at a time. Provide 10 to 18 kg of asphalt per 10 square meters of roof deck for each layer of insulation.

Apply asphalt when temperature is within plus or minus 15 degrees C of equiviscous temperature (EVT). Do not heat asphalt above asphalt's finished blowing temperature (FBT) or 275 degrees C, whichever is less, for longer than 4 consecutive hours. Use thermometers to check temperatures during heating and application.]

3.4.2 [Installation Using Asphalt on Steel Decks

NOTE: Delete these requirements and include paragraph entitled "Installation Using Asphalt" when a vapor retarder is required over steel decks.

Secure first layer of insulation [and thermal barrier] to deck with piercing or self-drilling, self-tapping fasteners. Engage fasteners by driving them through insulation into top flange of steel deck. Use driving method prescribed by fastener manufacturer. Insulation joints parallel to ribs of deck shall occur on solid bearing surfaces only, not over open ribs. Secure succeeding layers with solid asphalt moppings.]

3.4.3 [Installation Using Only Mechanical Fasteners

Secure total thickness of insulation with penetrating type fasteners.]

3.4.4 Special Precautions for Installation of Foam Insulation

3.4.4.1 Polyisocyanurate Insulation

Where polyisocyanurate foam board insulation is provided, 19 mm thick expanded perlite board insulation over top surface of foam board insulation. Stagger joints of insulation with respect to foam board insulation below.

3.4.4.2 [Polystyrene Insulation

NOTE: Include these requirements when polystyrene insulation is used under fully-adhered EPDM or CPE roofing.

- a. Over top surface of non-composite polystyrene board, install 19 mm thick expanded perlite board, or other overlayment approved by roofing sheet manufacturer. Tightly butt and stagger joints of field applied overlayment board at least 150 mm with respect to the polystyrene board below. Apply 150 mm wide glass fiber roofing tape centered over joints and edges of overlayment board.
- b. Where composite boards consisting of polystyrene insulation are provided, apply 150 mm wide glass-fiber roofing tape centered over joints and edges of composite board. Apply joint strips as recommended by roofing sheet manufacturer.]

3.4.5 Cant Strips

NOTE: Generally cant strips are not required for single ply roofing systems. However, if cant strips are necessary, coordinate location with mechanical drawings to ensure that no projections, such as vent pipes and braces, will be constructed through or within 250 mm of cant strips. Specify wood cants, edge strips, and pressure preservative treatment in Section 06100, "Rough Carpentry." Delete reference to asphalt application unless asphalt is used in applying the insulation.

Where indicated, provide cant strips at intersections of roof with walls, parapets, and curbs extending above roof. Wood cant strips shall bear on and be anchored to wood blocking. Fit cant strips flush against vertical surfaces. Where possible, nail cant strips to adjoining surfaces. Where cant strips are installed against non-nailable materials, install in [heavy mopping of asphalt or set in a heavy coating of asphalt roof cement] [an approved adhesive].

3.4.6 Tapered Edge Strips [and Crickets]

NOTE: Delete reference to asphalt application unless asphalt is used in installing the insulation.

Where indicated, provide edge strips [and crickets] in the right angle formed by junction of roof and wood nailing strips that extend above level of roof. Install edge strips flush against vertical surfaces of wood nailing strips. Where possible, nail edge strips to adjoining surfaces. Where installed against non-nailable materials, install in [heavy mopping of asphalt or set in heavy coating of asphalt roof cement] [an approved adhesive].

3.5 PROTECTION

3.5.1 Protection of Applied Insulation

Completely cover each day's installation of insulation with the finished roofing specified in Section [_____, "_____"] on same day. Do not permit phased construction. Protect open ends of each day's work with temporary water cutoffs, and remove when work is resumed. Protect open spaces between insulation and parapets or other walls and spaces at curbs, scuttles, and expansion joints, until permanent roofing and flashing are applied. Do not permit storing, walking, wheeling, or trucking directly on insulation or on roofed surfaces. Provide smooth, clean board or plank walkways, runways, and platforms near supports, as necessary, to distribute weight to conform to [indicated live load limits of roof construction] [a [_____] kg/sq. m live load limit].

3.5.2 Damaged Work and Materials

Restore work and materials that become damaged during construction to original condition or replace with new materials.

-- End of Section --